United States of America

Department of Transportation — Federal Aviation Administration

Supplemental Type Certificate

Number SE611GL

This certificate, issued to Shadin Company, Inc.
14280 N. 23rd Avenue
Plymouth, Minnesota 55447

certifies that the change in the type design for the following product with the limitations and conditions thereof as specified hereon meets the airworthiness requirements of Part 13 *of the* Civil Air *Regulations.* See Type Certificate Data Sheet 1E4 for complete certification basis.

Original Product — Type Certificate Number: 1E4

Make: Textron Lycoming

Model: IO-540-J4A5, -C4B5, -C4D5D, -C1B5, -G1B5, -G1C5, -G1D5, -K1A5, -K1A5D, -K1G5, -K1G5D, -D4A5, -N1A5, -R1A5, -T4B5D

Description of Type Design Change:

Incorporation of a Fuel Flow Transducer in accordance with Shadin Company Report Number 4046, revised September 10, 1990, or other FAA Approved revision.

Limitations and Conditions:

This approval should not be extended to other engines of these models on which other previously approved modifications are incorporated, unless it is determined by the installer that the interrelationship between this change and any other previously approved modifications will introduce no adverse effect on the airworthiness of these engines.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: 11/20/81

Date of issuance: 06/04/82

Date reissued:

Date amended: 09/24/84, 10/17/84, 06/20/85, 07/08/86 12/18/90

By direction of the Administrator

Charles L. Smalley
(Signature)

for Donald P. Michal, Manager
Chicago Aircraft Certification Office
(Title)

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.47.

FAA Form 8110-2 (10-68)

STOP

YOUR AIRCRAFT MAY HAVE OPTIONAL EQUIPMENT INSTALLED. THIS COULD CHANGE THE LENGTH OF FUEL LINES REQUIRED TO INSTALL THIS SYSTEM. PLEASE CHECK YOUR AIRCRAFT FOR PROPER LENGTH BEFORE CUTTING OR BUYING FUEL LINES.

Shadin Company, Inc.
14280 North 23rd Avenue
Plymouth, MN 55447

Report: 4046
Original Date: 17 November 1981
Revision Date: 10 September 1990
Subject: Digital Fuel Flow Meter
Installation
LYCOMING:
IO-540-J4A5, -C4B5, -C1B5, -C4D5D
IO-540-G1B5, -G1C5, -G1D5
IO-540-K1A5, -K1A5D
IO-540-K1G5, -K1G5D
IO-540-D4A5, -N1A5, -R1A5 , -T4B5D

F A A
A P P R O V E D

DEC 18 1990

CHICAGO AIRCRAFT
CERTIFICATION OFFICE
CENTRAL REGION

Shadin Company, Inc.
14280 North 23rd Avenue
Plymouth, MN 55447

REPORT #4046

Original Date: 17 November 1981
Revision Date: 10 September 1990

PAGE CONTROL CHART

SEC. I.	DATE	REVISION
Drawing List		
4046-20 Transducer Installation	10 Sep. 90	C
4046-21 Transducer Installation	22 Apr. 85	-
SEC. II.		
System Description		
Page 1	10 Sep. 90	A
Page 2	10 Sep. 90	A
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Installation Procedure		
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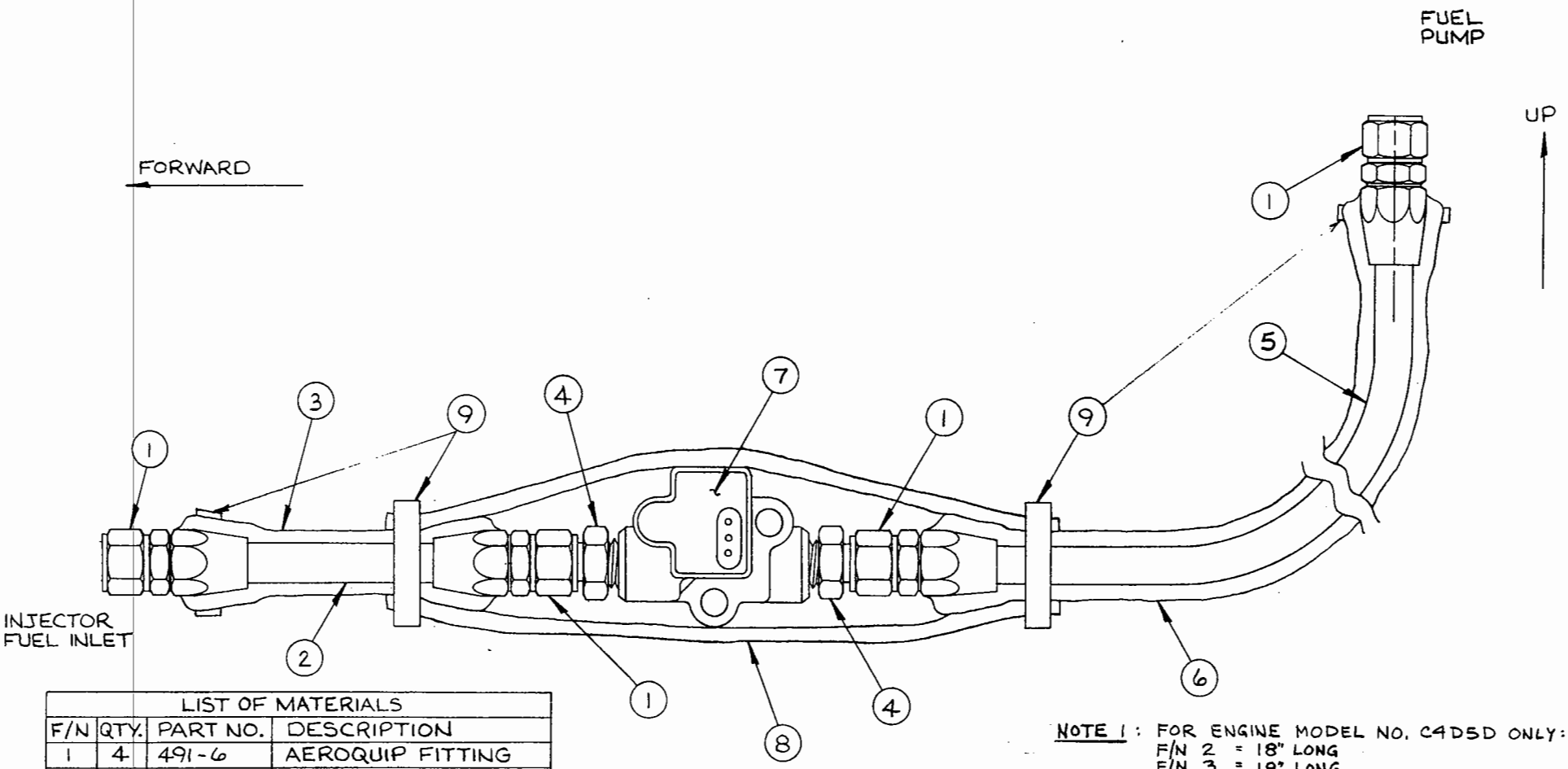
SEC. IV.		
Technical Specifications		
Page 1	10 Sep. 90	A

FAA
APPROVED
DEC 18 1990
CHICAGO AIRCRAFT
CERTIFICATION OFFICE
CENTRAL REGION



LIST OF MATERIALS				
F/N	QTY.	PART NO.	DESCRIPTION	
1	4	491-6	AEROQUIP FITTING	
2	5½"	303-6	AEROQUIP HOSE	SEE NOTE 1
3	5½"	AE102/624-12	AEROQUIP FIRESLEEVE	SEE NOTE 1
4	2	AN816-6	PIPE-TO-FLARE FITTING	
5	14"	303-6	AEROQUIP HOSE	SEE NOTE 1
6	14"	AE102/624-12	AEROQUIP FIRESLEEVE	SEE NOTE 1
7	1	201-B	FLOW TRANSDUCER	
8	7"	AE102/624-24	AEROQUIP FIRESLEEVE	
9	4	A-3122-8-1J	SPEED CLAMP	

NOTE 1: FOR ENGINE MODEL NO. C4D5D ONLY:
F/N 2 = 18" LONG
F/N 3 = 18" LONG
F/N 5 = 5½" LONG
F/N 6 = 5½" LONG

REV.	DATE	DESCRIPTION
C	10 SEP 90	ADDED -T4B5D

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES:

ORIGINAL DATE OF DRAWING 17 NOV 81
DRAFTSMAN R. LEHMAN
CHECKER
ENGINEER
SUBMITTED

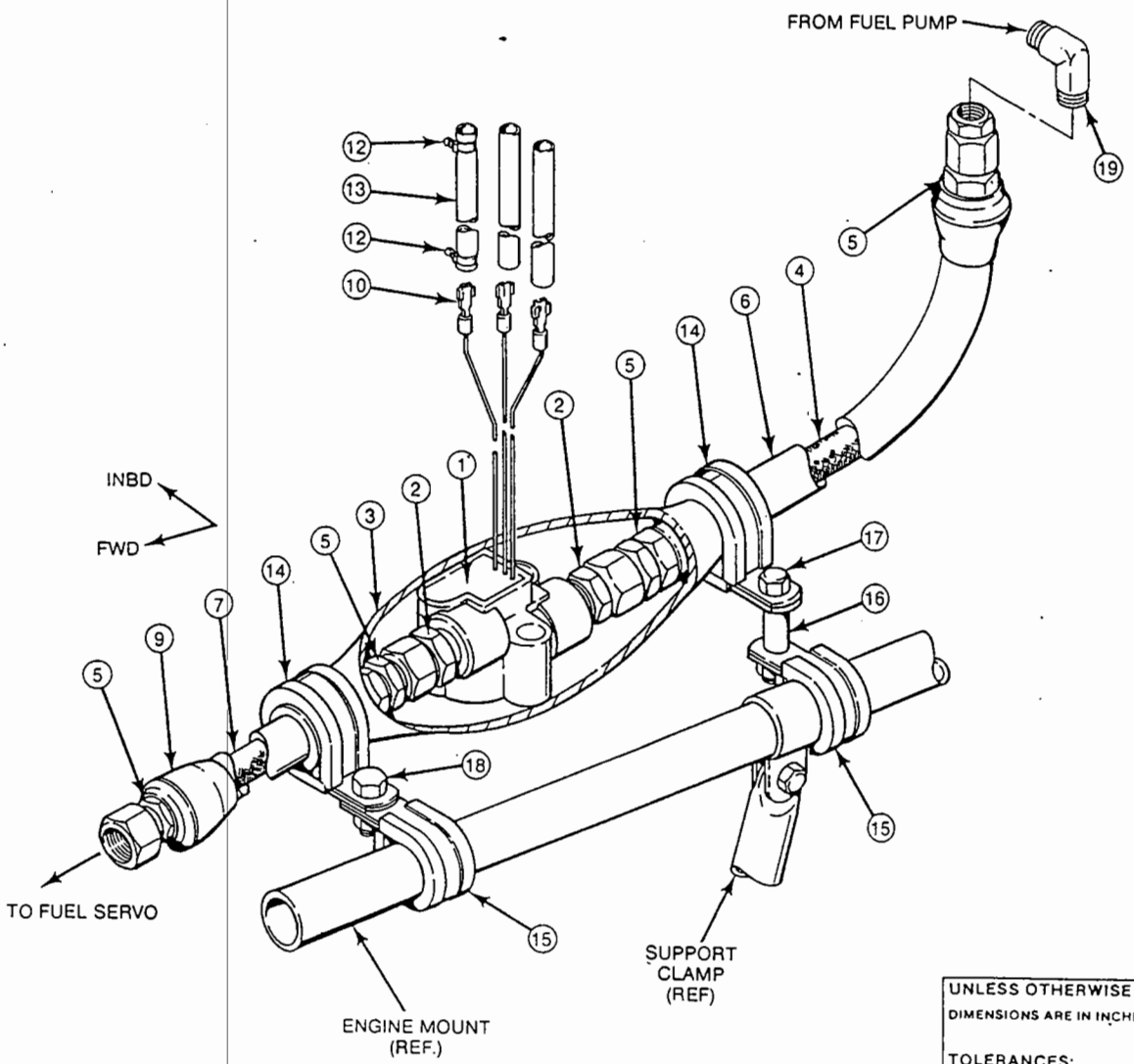
MATERIAL:

NEXT ASSEMBLY:

SHADIN COMPANY, INC.
MINNEAPOLIS MINNESOTA 55426

FUEL FLOW TRANSDUCER ADDITION
AVCO, LYCOMING -T4B5D
IO-540, J4A5, C4B5, C1B5, G1B5, G1C5, G1D5, K1A5, K1A5D, K1G5, K1G5D, C4D5D

CODE IDENT NO. 4046-20
SIZE B
REV LTR C
SCALE
WGT.
SHEET OF



LIST OF MATERIALS

ITEM	QTY.	PART NO.	DESCRIPTION	
1	1	201-B/680501	TRANSDUCER-FLOSCAN	
2	2	AN816-6	STRAIGHT IN NIPPLE FLARED PIPE THD.	
3	1	AE102-24	FIRE SLEEVE-AEROQUIP 8"	
4	1	8958P-2-1	*HOSE ASSY-AEROQUIP 20½" (303-6)	1
5	4	491-6	STRAIGHT FLARE FITTINGS	
6	1	AE102-12	FIRE SLEEVE-AEROQUIP 18½"	
7	1	8958P-2-2	*HOSE ASSY-AEROQUIP 22" (303-6)	2
8			(DELETED)	
9	1	AE102-12	FIRE SLEEVE-AEROQUIP 20"	
10	6	RB-14-D	WRISTLOCKS	
11	1	AN932-2D	PLUG-PIPE THD.	
12	10	TY-524M	TY RAPS-6"	
13	1	PLASTIC SHIELDING-INSULATOR 6"x5/16" I.D.		
14	2	H-22 (MS 21919)	SPEED CLAMP	
15	2	H-12 (MS 21919)	SPEED CLAMP	
16	1	NAS43D03-67	STANDOFF 1"x3/16" I.D.	
17	1	AN 3-13	BOLT & S/L NUT	
18	1	AN526-10R8	SCREW & S/L NUT	
19	1	AN833-6	90° NIPPLE FLARED-PIPE THD.	3

NOTES:

MEASURED END TO END OF FITTINGS

1. HOSE ASSY (ITEMS 4-6) ALSO VAN DUSEN AIRCRAFT SUPPLY P/N 620000-6-0190
2. HOSE ASSY (ITEMS 5, 7, 9) ALSO VAN DUSEN AIRCRAFT SUPPLY P/N 620000-6-0206
3. SOMETIMES NEEDED -

UNLESS OTHERWISE NOTED DIMENSIONS ARE IN INCHES TOLERANCES:	ORIGINAL DATE OF DRAWING 4-22-85 DRAFTSMAN CHECKER ENGINEER SUBMITTED	SHADIN COMPANY, INC. MINNEAPOLIS, MINNESOTA 55426, U.S.A. FUEL FLOW TRANSDUCER INSTALLATION Avco Lycoming IO-540-D4A5, -N1A5, -R1A5
MATERIAL:	NEXT ASSEMBLY:	CODE IDENT. NO. 4046-21 / SIZE B / REV LTR SCALE / WGT. / SHEET OF

Shadin Co., Inc.
Report: #4046
Date: 10 Sep., 1990
Rev.: A
Sec.: II.1

DIGITAL FUEL FLOW METER

SYSTEM DESCRIPTION

Digiflo, the Digital Fuel Flow meter, is designed to replace Analog Mechanical Fuel Flow Meters. It eliminates the fuel lines in such instruments from behind the panel. It maintains a high degree of accuracy (2 percent or better) which was not possible before. Digiflo provides additional functions such as time remaining, gallons used and gallons remaining.

The system consists of a fuel flow transducer, located in the fuel control unit and fuel flow divider which generates electrical pulses corresponding to the amount of fuel passing through. The transducer is designed in such a way that if the rotor is blocked it cannot interrupt the fuel flow to the engine.

The panel mounted unit contains all circuits necessary to count the generated pulses through the microprocessor and to display the fuel flow and other functions using permanently installed software. The fuel flow in gallons per hour is always displayed at the lower half of the instrument face. The time remaining, gallons used, and gallons remaining are continuously computed and either displayed or stored for later display. The time remaining is displayed at the upper display window. Gallons remaining and gallons used share the same upper window and either can be displayed by pressing the appropriate button.

During power shut-down, the amount of fuel remaining is stored into the nonvolatile memory, which requires no power to retain the data.

Time remaining calculations are based on gallons remaining and actual fuel flow, which means that reducing the power or leaning the mixture will result in increasing the time remaining.

If the calculated time remaining at any particular power setting drops below 30 minutes, the "Time Remaining" digits in the display window will start flashing.

The test function will enable the pilot to check the software and hardware against any malfunction through simulating two sample rates and checking the results against stored results.

The accuracy of this instrument depends entirely upon the accuracy of the data entered. A periodical checking of the actual fuel onboard will eliminate the accumulation of errors due to evaporation, leaks, theft, etc.

To match the transducer pulse count (K factor), (each transducer is marked with a dash number), to the microprocessor, a DIP switch has been provided on the top board. The switch has been set to match the transducers shipped with the system. In case a transducer with a different dash number is being used, the instrument has to be recalibrated.

Shadin Co., Inc.
Report: # 4046
Date: 10 Sep., 1990
Rev.: B
Sec.: III.1

INSTALLATION PROCEDURE

GENERAL

A complete through familiarization and understanding of the system is necessary before commencing the installation. All work must conform with A.C. 43.13 1A ch. 11 Sec. 2.

PROCEDURE

1) Identify the engine dash number and use the appropriate drawing. The transducer's dash number should match the dash number stamped on the instrument housing. Shut off the DC power, fuel valves and mixture controls. Gain access to the bottom section of the engine.

2) Remove the -6 hose between the engine driven fuel pump and the injector, fabricate a new line and install the Aeroequip 491-6 hoseend fittings as per the drawing.

3) Install the AN 816-6 fittings into the transducer body. Connect the transducer to the hose as shown on the drawings. Monitoring the inlet and out ports. After tightening, slip the Aeroequip AE 102/624 fire sleeve over the transducer. Pass the transducer wires under the fire sleeve towards the firewall as shown on the drawings.

4) Tie the two ends of the fire sleeve using metal tie bands. Install the hose back between the engine driven pump and the injector.

5) Connect the wires to the transducers using the B-143-D wristlocks, with plastic sleeves to insulate and secure them with tie wraps.

6) Turn the master switch on, run the booster pumps and check for leaks.

7) Start the engine and check the fuel pressure. Read just if necessary following airframe and engine manufacturer instructions.

8) Make necessary entry into engine logs.

Report: # 4046
Date: 10 Sept., 1990
Rev. A
Sec.: IV.1

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TECHNICAL SPECIFICATIONS

Digital Fuel Flow Meter Catalog Number 4005-000

SPECIFICATIONS

Maximum Useable fuel:	1800 gallons
Maximum altitude:	40,000 ft.
Operating Temperature:	-30 C to 50 C
Humidity:	up to 95% @ 32 C
Accuracy:	+/- 2%
Flow Range:	.6 - 60 GPH/Engine

ELECTRICAL RATING

Input voltage:	12-28 volt D.C.
Input current:	400 ma @ 14V or 28V Avg.

MECHANICAL RATING

Vibration:	5g
Weight:	Panel Unit: 1.3 lb.
	Transducer: App. 5 oz.

TRANSDUCER SPECIFICATION

Model Number:	201B
Flow range:	0.6-60 GPH
Linearity Across Flow Range, percent of reading:	+/- 1% (8-60 GPH)
	+/- 3% (0.6-60 GPH)
Average K factor (pulses/Gal.):	84,000
Pressure Drop:	.3 psi @ 15 GPH
	1.2 psi @ 30 GPH
	2.6 psi @ 60 GPH
Working Pressure:	200 psi
Minimum Bursting Pressure:	2000 psi
Temperature Range:	-65 C/125 C
Life Expectancy:	5,000 hr.